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Review Article

Safe anesthesia for office-based plastic surgery: Proceedings from the PRS Korea 2018 meeting in Seoul, Korea

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There has been an exponential increase in plastic surgery cases over the last 20 years, surging from 2.8 million to 17.5 million cases per year. Seventy-two percent of these cases are being performed in the office-based or ambulatory setting. There are certain advantages to performing aesthetic procedures in the office, but several widely publicized fatalities and malpractice claims has put the spotlight on patient safety and the lack of uniform regulation of office-based practices. While 33 states currently have legislation for office-based surgery and anesthesia, 17 states have no mandate to report patient deaths or adverse outcomes. The literature on office-base surgery and anesthesia has demonstrated significant improvements in patient safety over the last 20 years. In the following review of the proceedings from the PRS Korea 2018 meeting, we discuss several key concepts regarding safe anesthesia for office-based cosmetic surgery. These include the safe delivery of oxygen, appropriate local anesthetic usage and the avoidance of local anesthetic toxicity, the implementation of Enhanced Recovery after Surgery protocols, multimodal analgesic techniques with less reliance on narcotic pain medications, the use of surgical safety checklists, and incorporating "the patient" into the surgical decision-making process through decision aids.

Keywords Plastic surgery / Office-based anesthesia / Enhanced recovery after surgery / Checklist / Decision aids

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INTRODUCTION

In almost 20 years, there has been a 137% increase in cosmetic procedures in the United States. As of 2017, the American Society for Aesthetic Plastic Surgery reports 17.5 million cosmetic procedures performed, which was comprised of 1.8 million procedures cosmetic surgical procedures and 15.7 million minimally invasive procedures [1]. A majority of these cases are being performed in the office-based setting. It was reported in 2016 that 72% of cosmetic procedures were performed in the office, 19% in ambulatory surgical centers (ASCs) and 9% in the hospital [2]. The increasing number and variety of cases, complexity of cases and patients, and the extension of responsibility to anesthesia and non-anesthesia personnel, all have raised con-

cerns over the past few years on office anesthesia and patient safety.

As a result of several widely publicized fatalities and malpractice claims and the lack of uniform regulation of office-based practices, research efforts have begun to address some of the controversial issues and turn attention to patient safety in the office [3-8]. In 2003, Vila et al. [9] compared 2 years of reported adverse events and concluded that the relative risk of complications and death was 10 times greater in the office-based practices compared to ASCs. In terms of liability, an analysis of the American Society of Anesthesia (ASA) Closed Claims database prior to 1996 demonstrated that the majority of office-based surgery (OBS) claims (64%) were related to death or permanent injury [10]. With the initiation of state regulations, a 2013 update revealed that malpractice claims against anesthesiologists for adverse events in the office were in fact similar to other outpatient centers, but were more likely to involve plastic surgery procedures (45%) than other outpatient claims (18%) [10]. Soltani et al. [11] discovered in 2013 that not all procedures had equal risks. The authors stated that the most commonly reported adverse event associated with breast augmentation was postoperative bleeding, however, abdominoplasty was associated with more serious events such as death from pulmonary embolism, especially when combined with additional procedures. In the seminal article in 2014, Shapiro et al. [12] asserted that improvements in patient safety outcomes would improve through nationwide standardization of care, proper provider credentialing, facility accreditation, the use of safety checklists, and adherence to professional practice guidelines. Gupta et al. [13] in 2016 compared the outcomes of 183,914 plastic surgery procedures in accredited facilities, and the authors assert that the complication rates in office-based surgical practices, ASCs, and hospitals were 1.3%, 1.9%, and 2.4%, respectively. A recent 2018 study by Choi et al. [14] compared the safety profiles between non-operating room anesthesia (NORA) and operating room anesthesia (ORA), retrospectively analyzing 199,764 cases at a Korean tertiary hospital. Their results suggested that the mortality rate was similar (4.9 per 10,000 NORA cases versus 4.3 per 10,000 ORA cases) and that patient safety can be further improved by selecting healthier patients, performing less invasive or shorter procedures, and avoiding extremes of ages or emergency procedures for NORA cases. Based in the literature, significant strides have been made in patient safety for anesthesia in the office-based setting.

In the following review of the proceedings from the PRS 2018 Korea meeting, we discuss several key concepts regarding safe anesthesia for office-based cosmetic surgery. These include the safe delivery of oxygen, appropriate local anesthetic usage and the avoidance of local anesthetic toxicity (LAST), the implementation of Enhanced Recovery After Surgery (ERAS) protocols, multimodal analgesic techniques with less reliance on narcotic pain medications, the use of surgical safety checklists, and incorporating "the patient" into the surgical decision-making process through decision aids.

OXYGEN DELIVERY

The safe use of oxygen in the office is essential for patient safety during sedation for cosmetic procedures. It is routinely delivered to patients during sedation or monitored anesthesia care (MAC) via masks or nasal cannulas and poses an increased risk for operating room fires. Oxygen serves as an oxidizer, which when combined with an ignition source such as a spark or open flame, and fuel such as an alcohol prep solution, a sudden fire can occur with the potential to cause significant harm to the patient and/or operating room (OR) staff. Even at low flows, oxygen can slowly accumulate beneath the drapes and dressings, which could be ignited by an electrocautery source. Mehta et al. [15] assert that electrocautery-induced fires during MAC were recognized as the most common cause of OR fires claims. In addition to proper education and fire prevention protocols, the recognition of the fire triad (oxidizer, fuel, and ignition source), particularly the critical role of supplemental oxygen by an open delivery system during use of the electrocautery, is crucial to prevent OR fires [15]. An open oxygen source in near the surgical field, such as a nasal cannula or facemask, particularly increases the risk of fire during head and neck procedures.

Optimizing safety for patients undergoing conscious sedation with supplemental oxygen has been addressed by proposing an alternative technique of delivering oxygen by passing the nasal cannula through a rubber nasopharyngeal airway tube [16]. The authors concluded that oxygen readings around the face and nose were similar to room air at both low and high oxygen flow rates using the nasopharyngeal methods when compared to traditional nasal cannula oxygen delivery systems [16]. Reducing the concentration of oxygen in the surgical field is an effective technique for reducing the risk of OR fires. Another study by Kung et al. [17] examined the effect of vacuum suctioning and strategic draping to reduce oxygen concentrations around the head and neck. Their conclusion was that the use of a vacuum suction device during surgery would lower local oxygen concentrations. Although strategic tenting of surgical drapes has a theoretical benefit to decreasing the pooling of oxygen around the surgical field, the authors suggest that further investigation is necessary before routine use can be recommended [17]. In 2008, the American Society of Anesthesiology Task

Force published a practice advisory for the prevention and management of OR fires, which provided a concrete algorithm to address the individual components of the fire triad. In summary, the ASA Task Force recommends; (1) avoiding ignition sources in proximity to an oxidizer-enriched atmosphere; (2) configuring surgical drapes to minimize surgical drapes to minimize accumulation of oxidizers; (3) allowing sufficient drying time for flammable skin prep solutions; and (4) moistening sponges/gauze when use in proximity to ignition sources [18].

TUMESCENT ANESTHESIA AND LIDOCAINE

Liposuction is the most commonly performed surgical cosmetic procedure with more than 246,000 cases performed in 2017. Tumescent anesthesia is typically performed with liposuction and fat grafting where a large, dilute volume of lidocaine and epinephrine are infiltrated subcutaneously. Benefits of this technique include decreased bleeding and the reduced risk for hematoma, and desired pain management through the prolonged anesthetic effects of lidocaine. However, the use of the tumescent technique and liposuction is not a trivial procedure and carries its own set of risks. Major concerns include lidocaine toxicity, pulmonary or fat embolism, fluid overload, and hypothermia. The toxic effects of lidocaine are dose dependent and the current recommendation to avoid LAST is 35–55 mg/kg, but the maximum safe dosage is unknown. A prospective study performed in 2016 performed by Klein and Jeske [19] followed patients for 24 hours after tumescent anesthesia with and without liposuction. With 14 subjects receiving lidocaine doses from 19–52 mg/kg, all serum concentrations remained below 6 μg/mL and, as a result of delayed systemic absorption, the maximum safe dosages of tumescent lidocaine was therefore estimated to be 28 mg/kg without liposuction and 45 mg/kg with liposuction [19]. These dosages yield serum lidocaine concentrations below levels associated with mild toxicity and are an insignificant risk of harm to patients.

Although these studies show a relatively large safety profile for tumescent anesthesia in the office and ambulatory setting, considerations should be made regarding the site of injection or patient factors that may influence distribution, metabolism, or excretion of the drug. In the event of LAST, easy access and availability of a lipid emulsion is an essential component to anesthesia safety and crisis management in the office setting. The Association of Anaesthetists of Great Britain & Ireland (AAGBI) maintains an updated comprehensive safety guideline to assist with the prevention, recognition, and management of severe LAST [20].

NONSTEROIDAL ANTI-INFLAMMATORY DRUGS

Nonsteroidal anti-inflammatory drugs (NSAIDs) are common medications with multiple useful effects including pain relief and reduction of inflammation. However, surgeons commonly are reluctant to utilize NSAIDs due to perioperative bleeding concerns. There is evidence of increased bleeding time in experimental models, but the effects of bleeding time in cosmetic surgical patients continues to be a debated issue. A systematic review and meta-analysis performed in 2016 suggested that ibuprofen provides equivalent pain control to narcotics and was not associated with an increased risk of bleeding in plastic surgery patients [21]. Ketorolac is an attractive alternative for achieving pain control postoperatively but is also used sparingly due presumed platelet dysfunction caused by the non-selective, competitive blocking of the cyclooxygenase enzyme. Another meta-analysis of double-blinded, placebo-controlled trials demonstrated that postoperative bleeding was not significantly increased with ketorolac when compared with controls, and adverse effects were not statistically different between the groups and pain control was found to be superior with ketorolac compared with controls [22]. Despite the current studies, some have suggested that there are ample knowledge gaps regarding NSAID use, and they may not be appropriate for all types of plastic surgery (i.e., abdominoplasty or mammoplasty reduction surgery) [23]. NSAIDs such as ibuprofen or ketorolac can substantially improve postoperative pain control and are part of the multimodal approach to perioperative analgesia. The ASA currently recommends the routine use of NSAIDs for acute perioperative pain management, but there will need to be more assiduously performed prospective, blinded, randomized studies to provide more definitive guidance regarding their use in the office-based plastic surgery setting.

MULTIMODAL ANALGESIA AND ENHANCED RECOVERY AFTER SURGERY

Perioperative multimodal anesthetic approaches have been utilized for more than a decade, applying concepts of synergistic and additive pain relief with different techniques to reduce reliance on narcotic pain medicines, improve the overall patient experience and postoperative outcomes. The basic components of multimodal analgesia include neuraxial anesthesia such as epidural or spinal anesthesia, peripheral nerve blocks or field blocks, local anesthetic infiltration (intra-articular or incisional), and systemic drugs such as acetaminophen, NSAIDs, gabapen-

tinoids, ketamine, alpha-2 agonists, dexamethasone, tramadol, and the spared use of opioids [24]. The purpose of the multimodal approach is to halt the signals involved in the perception of pain, beginning with peripheral tissue injury, traveling up the dorsal horn of the spinal cord, and ascending via the spinothalamic tract centrally to the brain. The patient's emotions and cognition also have to be considered due to their role in processing nociceptive information via the descending pain modulatory system from the brain. Within plastic surgery, multimodal analgesia has shown promising results. A recent 2017 publication by Barker et al. [25] demonstrated that multimodal analgesia regimens using a combination of oral acetaminophen, gabapentin, and celecoxib significantly reduced post-anesthesia care unit narcotic use and pain scores in outpatient breast surgery. There is also attention being drawn to long-acting local anesthetics in breast surgery due to the excellent postoperative pain relief that continues for several days after the initial surgery. Liposomal bupivacaine, for example, is a unique local anesthetic formulation that allows for a prolonged duration of action and a slower absorption into systemic circulation. Studies evaluating liposomal bupivacaine in breast surgical procedures have shown reduced postoperative opioid usage (and their undesired side-effects), reduced hospital length of stay, lower postsurgical pain scores, and higher patient satisfaction [26]. Postoperative pain management is one of the key components of enhancing recovery after surgery for breast surgical procedures.

Enhanced Recovery after Surgery (ERAS) pathways and protocols have been developed for several surgical specialties, aiming to reduce postoperative pain, opioid use, postoperative nausea and vomiting (PONV), and hospital length of stay. This type of protocol, initially implemented in colorectal surgery, has demonstrated significant improvements in patient morbidity, length of stay, and survival [27]. In the context of breast surgery, recent 2017 study demonstrated that the adoption of enhanced recovery pathways for microsurgical breast reconstruction was consistent with other ERAS studies, with significantly decrease opioid consumption and reduced length of stay [28]. Additionally, a systematic review of meta-analyses, randomized controlled trials, and large prospective cohorts was conducted for patients undergoing breast reconstructive surgery and, based on the best available evidence, a consensus review by the ERAS Society published recommendations to support the utilization of opioid-sparing perioperative medications, adequate preoperative hydration, early feeding, early mobilization, hypothermia prevention, and the use of anesthetics techniques that decrease PONV and postoperative pain [29]. When adopted as a comprehensive protocol, along with the appropriate preadmission patient education and counseling, the studies mentioned above provide evidence to suggest that ERAS pathways have been used successfully in cosmetic surgery with improved postoperative outcomes.

NON-OPIOID-BASED ADJUVANT ANALGESIA

An important component of the ERAS protocol is the utilization of non-opioid medications, which is especially important for office-based surgical procedures. Multiple medication adjuncts are available to improve perioperative pain management with the goal of decreasing opioid requirements and opioid-related side effects. For example, glucocorticoids have potent immunomodulatory effects, which may affect the neurological processes involved in pain sensation. Dexamethasone, known for its antiemetic properties, is suggested to have analgesic effects but the drug's efficacy in postoperative analgesia remains unclear. Waldron et al. [30] conducted a systematic review and meta-analysis to evaluate the impact of a single intravenous dose of dexamethasone on postoperative pain and possible adverse effects associated with its administration. The authors found that the patients who received dexamethasone had significantly lower pain scores at 2, 24, and 48 hours postoperatively, with a demonstrated decrease in postoperative opioid requirements. They also exhibited significantly shorter post-anesthesia recovery unit (PACU) stays with no increase in adverse events [30]. In addition to the inherent antiemetic properties, modest but statically significant analgesic benefits, and large safety profile, perioperative dexamethasone may assist in enhancing recovery after surgery.

Gabapentanoids, such as pregabalin and gabapentin are frequently utilized as part of the perioperative analgesic regimen. Although they may differ somewhat, both bare structural resemblance to gamma-aminobutyric acid, and exert their effects via reducing dorsal horn neuronal excitability. A systematic review and meta-analysis performed by Mishriky et al. [31] examined the impact of pregabalin administration on postoperative pain scores and opioid consumption. The authors suggest that suggests that pregabalin improves postoperative analgesia when compared with placebo at the expense of increased sedation and possible visual disturbances. Pain scores and opioid consumption were both significantly decreased despite no difference in PACU stay between the groups [31]. As with dexamethasone use, preoperative administration gabapentin or pregabalin may serve as useful adjunct for postoperative analgesia.

Other adjunct analgesics such as acetaminophen, ketamine, intravenous lidocaine, and α2 agonists have also demonstrated evidence of efficacy in the perioperative setting [32]. However,

they should be utilized on an individual basis with regard to the possible side effects, drug interactions, or contraindications. The evidence given by the above-mentioned studies suggests that non-opioid-based adjuvant analgesia is useful for lowering pain scores, decreasing opioid requirements and opioid-related side effects, decreasing PONV, shortening PACU stays, and increasing patient satisfaction.

PERIPHERAL NERVE AND FIELD BLOCKS

Another cornerstone of multimodal analgesia and ERAS pathways is the performance of peripheral nerve blocks or field blocks with longer acting local anesthetics. For breast surgeries, the paravertebral block (PVB) is one of the peripheral nerve blocks that has shown efficacy in perioperative pain management by blocking several thoracic dermatomes [33-36]. A retrospective study performed at the Mayo Clinic, Rochester, MN in 2014 evaluated whether PVB altered opioid use, antiemetic use, and length of stay in patients undergoing mastectomy. The authors found that the patients who received the PVB, especially patients undergoing bilateral mastectomy with immediate breast reconstruction, demonstrated significantly decreased opioid use and decreased need for postoperative antiemetic medication [33]. Another recent prospective, randomized, controlled trial by Wolf et al. [34] examined the effectiveness of PVB on patients undergoing breast reconstruction over a 3-year period. The authors concluded that PVB demonstrated significant reductions in both postoperative pain and opioid consumption in patients receiving blocks compared to general anesthesia alone in outpatient breast reconstruction surgery [34]. Especially when used with the use of ultrasound, the routine performance of the PVB in patients undergoing mastectomy with immediate breast reconstruction is a safe method to achieve adequate postoperative analgesia, and it is associated with very few complications [36].

Field blocks such as the transversus abdominis plane (TAP) block are also useful for postoperative pain management for abdominally based plastic surgery. The TAP block reliably provides anesthesia to the anterior and lateral abdominal wall, whereby local anesthetic is injected in the plane between the internal oblique and transversus abdominis muscles. Several studies have demonstrated the efficacy of the TAP block in abdominally based microvascular breast reconstruction breast surgery, which demonstrated significantly reduced postoperative pain scores and accelerated recovery [37,38]. Long-acting liposomal bupivacaine was the local anesthetic used in these studies.

LIPOSOMAL BUPIVACAINE

Bupivacaine is a long-acting, amide local anesthetic that is used in a wide variety of surgical and anesthesia roles, including direct injection into the surgical field, peripheral nerve blocks, neuraxial anesthesia, and use in elastomeric pain pumps. In 2011, a new formulation of bupivacaine received FDA approval, which introduced an extended release version that increased the duration of action from 8–10 hours to 3 or 4 days. Liposomal bupivacaine uses a carrier matrix that is made up of microscopic, spherical, lipid-based particles within a honeycomb of numerous, non-concentric, internal aqueous chambers containing the encapsulated drug [39]. The suspension of the bupivacaine within the lipid matrix results in a slower release, and thus a slower the rate of absorption in the tissues. Among plastic surgery procedures, it has been approved for use in breast surgery and has had favorable results in patients' perception of pain control following surgery. A retrospective analysis by Eberle and Newman [40] demonstrated that plastic surgery patients typically reported lower pain scores, higher overall satisfaction, and were even willing to absorb additional cost associated with its use.

Despite the promising results of liposomal bupivacaine in postoperative pain management for plastic surgery procedures, the cost remains an issue. The added expense may cause many offices and ASCs to resist the implementation of is use into their routine perioperative analgesic protocols. Future prospective studies on the cost-effectiveness and clinical efficacy of liposomal bupivacaine will be key for the facilitation and standardization of its use for office-based multimodal analgesia and ERAS protocols.

SURGICAL SAFETY CHECKLISTS

Research into surgical safety checklists has demonstrated success in the reduction of medical errors, complications, and perioperative morbidity and mortality in the hospital setting [41]. A prospective trial performed by De Vries et al. [42] compared the outcomes of patients before and after the implementation of a surgical checklist across six hospitals, and an absolute risk reduction of 10.6% for postoperative complications was observed. Based upon research, in January 2012, the Centers for Medicare and Medicaid Services instituted the use of a safe-surgery checklist in ambulatory surgicenters. The use of a checklist creates the expectation that organizations will assess effective communication and safe practices during the perioperative care of patients. Surgical safety checklists have recently garnered increased public attention and academic consideration given the capacity to

encourage collaboration, improve communication between surgeons, anesthesia, and OR nursing staff, and reduce patient morbidity and mortality. For example, Shapiro et al. [41] reported that the adoption and utilization of the World Health Organization (WHO) surgical safety checklist revealed a decrease in mortality from 1.5% to 0.8% and a decrease in overall complications from 11% to 7%.

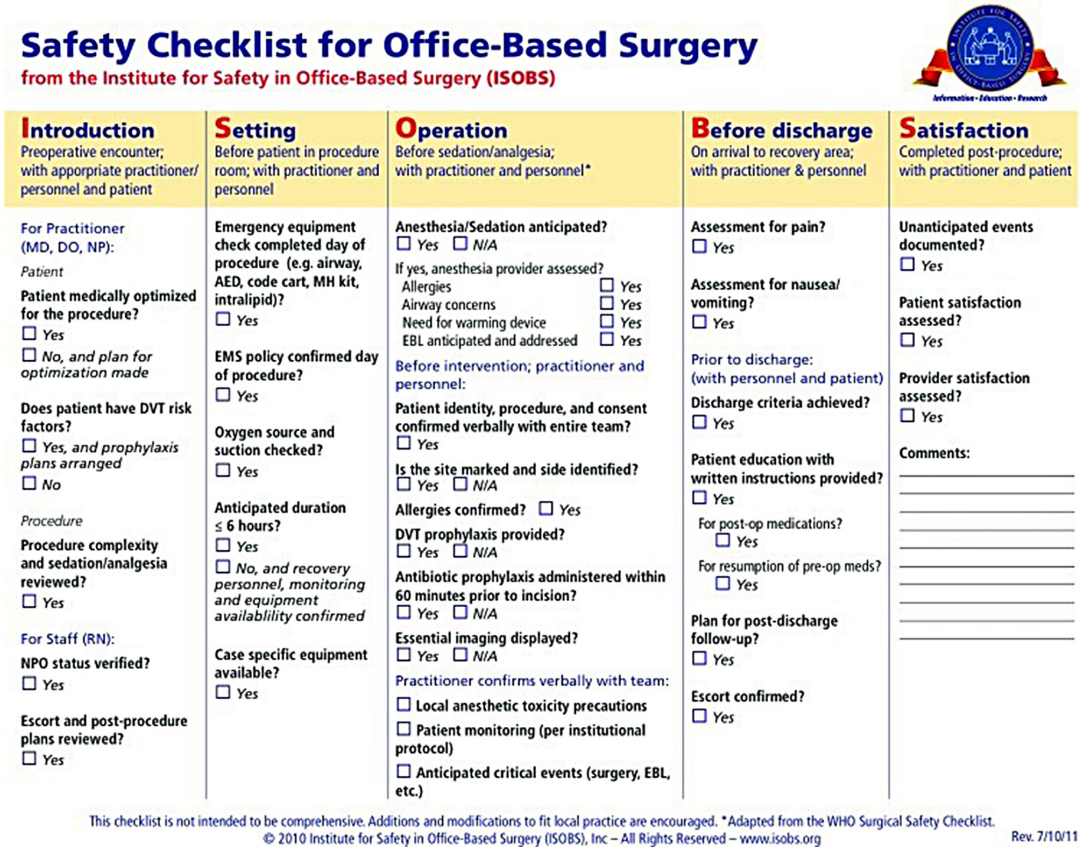
Multiple studies have assessed the success of using a safety checklist in the hospital setting, but the office-based practice remains relatively unstudied. In 2012, Rosenberg et al. [43] used a customized perioperative checklist designed to assess baseline and postoperative outcomes. Adapted from the WHO surgical safety checklist, the Institute for Safety in Office-Based Surgery developed the 28-element, perioperative checklist template for use in the office-based surgical setting, which was applied to 219 cases in an office-based plastic surgery practice. The authors demonstrated a reduction in postoperative complication rate from 15.1 complications per 100 patients before implementation to 2.72 per 100 patients afterward [43]. In addition to the improved patient safety and outcomes, patient satisfaction scores increased from 57.1% to 90.8% [43]. The checklist used for this study was later published in the *AORN Journal* in 2013 and featured in the 2016 American Society for Healthcare Risk Management resource manual for OBS (Fig. 1).

PATIENT EDUCATION, DECISION AIDS, AND SHARED DECISION MAKING

Deciding on the best treatment or screening options can be a daunting task for any patient. In many cases, simply having access to information or education can significantly improve the ability to be an active participant in the decision-making process regarding healthcare options. Decision aids, in the form of pamphlets, videos, or web-based tools, can describe the available options and help patients make decisions based on a more informed and personalized view. These are powerful patient-centered education tools designed to clearly and simply outline an explanation of procedures, risks and benefits, and possible outcomes. When patients use decision aids, they improve their

Fig. 1. Office-based surgical safety checklist

Reproduced with permission from the Institute for Safety in Office-Based Surgery (ISOBS).



Safety Checklist for Office-Based Surgery

from the Institute for Safety in Office-Based Surgery (ISOBS)

Introduction — Preoperative encounter; with appropriate practitioner/ personnel and patient

For Practitioner (MD, DO, NP):

Patient

Patient medically optimized for the procedure?
☐ Yes
☐ *No, and plan for optimization made*

Does patient have DVT risk factors?
☐ *Yes, and prophylaxis plans arranged*
☐ *No*

Procedure

Procedure complexity and sedation/analgesia reviewed?
☐ Yes

For Staff (RN):

NPO status verified?
☐ Yes

Escort and post-procedure plans reviewed?
☐ Yes

Setting — Before patient in procedure room; with practitioner and personnel

Emergency equipment check completed day of procedure (e.g. airway, AED, code cart, MH kit, intralipid)?
☐ Yes

EMS policy confirmed day of procedure?
☐ Yes

Oxygen source and suction checked?
☐ Yes

Anticipated duration ≤ 6 hours?
☐ Yes
☐ *No, and recovery personnel, monitoring and equipment availablility confirmed*

Case specific equipment available?
☐ Yes

Operation — Before sedation/analgesia; with practitioner and personnel*

Anesthesia/Sedation anticipated?
☐ Yes ☐ *N/A*

If yes, anesthesia provider assessed?
Allergies ☐ Yes
Airway concerns ☐ Yes
Need for warming device ☐ Yes
EBL anticipated and addressed ☐ Yes

Before intervention; practitioner and personnel:

Patient identity, procedure, and consent confirmed verbally with entire team?
☐ Yes

Is the site marked and side identified?
☐ Yes ☐ *N/A*

Allergies confirmed? ☐ Yes

DVT prophylaxis provided?
☐ Yes ☐ *N/A*

Antibiotic prophylaxis administered within 60 minutes prior to incision?
☐ Yes ☐ *N/A*

Essential imaging displayed?
☐ Yes ☐ *N/A*

Practitioner confirms verbally with team:
☐ Local anesthetic toxicity precautions
☐ Patient monitoring (per institutional protocol)
☐ Anticipated critical events (surgery, EBL, etc.)

Before discharge — On arrival to recovery area; with practitioner & personnel

Assessment for pain?
☐ Yes

Assessment for nausea/ vomiting?
☐ Yes

Prior to discharge: (with personnel and patient)

Discharge criteria achieved?
☐ Yes

Patient education with written instructions provided?
☐ Yes

For post-op medications?
☐ Yes

For resumption of pre-op meds?
☐ Yes

Plan for post-discharge follow-up?
☐ Yes

Escort confirmed?
☐ Yes

Satisfaction — Completed post-procedure; with practitioner and patient

Unanticipated events documented?
☐ Yes

Patient satisfaction assessed?
☐ Yes

Provider satisfaction assessed?
☐ Yes

Comments:

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged. *Adapted from the WHO Surgical Safety Checklist.

Rev. 7/10/11

knowledge of the options, feel more informed and clear about what matters most to them, probably participate more in decision making, and probably have more accurate expectations of benefits and harms of the available options [44]. The American Society of Anesthesiologists (ASA) developed several preoperative patient education decision aids to guide patients through the process of determining the type of anesthesia that they would prefer. Patients can access decision aids on peripheral nerve blocks and epidural and spinal anesthesia (available at https://asahq.org). The success of this program has encouraged the ASA Committee on Patient Safety and Education to create an additional decision aid on MAC, which is completed and currently in the testing phase.

As mentioned above, surgical safety checklists are effective in improving patient outcomes and satisfaction, but the concept of involving the patient in the checklist is novel idea that is relatively unexplored. In 2015, Fernando et al. [45] examined the concepts for the development of a customizable checklist for patient use to develop a framework for developing a patient-centered checklist. They asserted that physicians of all specialties, nurses, patients, patient advocates, and administrators could take an active role in checklist development and dissemination. A follow-up cross-sectional survey analysis revealed that that 94% of patients and 83% of providers thought the checklist would be beneficial for patients [46]. The analysis included potential barriers to checklist implementation reported by 37% of providers, which included fear of confusing the patient, making patients doubt the care they were receiving, taking too much time, and lack of resources [46].

There is recent evident evidence suggesting that intentional patient inclusion in medical decision-making processes may improve outcomes in the office-based plastic surgery setting. Adams and Small [47] performed a prospective study of 300 consecutive patients undergoing breast augmentations from 2001 to 2005. Each patient underwent a defined process of breast augmentation including structured patient education and informed consent, tissue-based preoperative planning consultation, refined surgical technique, and structured postoperative instructions, management, and subsequent follow-up [47]. Thorough education of the surgical course and shared involvement in the decision-making process resulted in patients having a better understanding of their personal characteristics and tissue limitations, thus maintaining more realistic expectations [47]. The overall rate of re-operation for the cohort within the study follow-up was only 3.7% [47]. These results suggest that patient-centered education, consultation, and shared decision-making are important for improving patient satisfaction and surgical outcomes.

DISCUSSION

The last 20 years has demonstrated a substantial increase in the number and complexity of patients and procedures performed in the office. Although not described in the 2017 report, 72% (11.7 million) of the 16.4 million cosmetic procedures performed in 2016 were performed in the office [2]. There are numerous legislative and regulatory changes regarding patient safety in the office, but governing bodies have not been able to keep up with the exponential growth. As of 2018, only 33 states have guidelines, policies, or position statements regarding OBS, which makes gathering outcome data difficult due to the fact that 17 states have no duty to report patient deaths or adverse events. This lack of uniform reporting has come to light as a patient safety concern as recent high-profile cases resulting in death or disability has caught the attention of the media. For example, issues such as administration of sedation or anesthesia by non-anesthesia personnel and physicians practicing outside of the areas in which they are trained ("practice drift") may add additional risks for medical errors [48]. Has OBS become safer over the last 25 years? It has according to the literature, but improvements in patient safety outcomes can still be made through nationwide standardization of care, proper provider credentialing, facility accreditation, the use safety checklists, and adhering to professional practice guidelines [12]. Future goals should focus on increasing patient engagement and education, implementing uniform state regulation of office-based practices throughout the United States, and normalizing and improving adverse events and mortality reporting. Improved reporting of patient outcomes will help direct future research on safe anesthesia for OBS, which will serve to benefit patient safety and satisfaction in the rapidly expanding field of cosmetic surgery.

NOTES

Conflict of interest

FES is the cofounder of The Institute for Safety in Office-Based Surgery (ISOBS): a non-profit, multidisciplinary organization to promote patient safety in office-based surgery and to encourage interdisciplinary collaboration scholarship physician and patient education. No other potential conflict of interest relevant to this article was reported.

Author contribution

Concept and design, literature review, drafting of the manuscript, critical revision of the manuscript for important intellectual content: Osman BM, Shapiro FE. Final approval of the manuscript: Osman BM, Shapiro FE.

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